



First records of two rain frogs, genus *Pristimantis* (Anura, Craugastoridae), for Colombia

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Abstract: *Pristimantis yukpa* and *P. rivasi* are two rain frogs recently described from Sierra de Perijá in Venezuela. Although these species have been expected to occur in the Colombian side of this mountain range, no evidence of their presence was available to date. Herein, I report for the first time the presence of these species for Serranía de Perijá in Colombia. Updated maps of their geographical distribution are shown.

Key words: Amphibia; Craugastoridae; direct-developing frog; geographic distribution; Perijá

The more than 750 species of the direct-developing frogs of the family Craugastoridae exemplify the great Neotropical biodiversity (Frost 2015; Hedges et al. 2008). This family comprises 19 formally described genera, including *Pristimantis* Jiménez de la Espada, 1870, the most specious genus among terrestrial vertebrates with more than 480 species (Hedges et al. 2008; Padial et al. 2014; Chaparro et al. 2015; Frost 2015). *Pristimantis* species are distributed from the east of Honduras in Central America to northern Argentina in South America, and in the Caribbean islands of Trinidad and Tobago, Grenada, and the Lesser Antilles (Chaparro et al. 2015; Frost 2015). However, most species are concentrated in the North Andes (Meza-Joya and Torres 2016), with Colombia the country with the highest species richness with 209 species (Acosta Galvis and Cuentas 2016).

The Serranía de Perijá, known as Sierra de Perijá in Venezuela, is the northernmost portion of the Eastern Andes, extending from 09°10' N, 073°24' W to 10°56' N, 072°30' W (Rivera-Díaz and Fernández-Alonso 2003). This mountain range forms a natural border between Colombia (Cesar and La Guajira departments) and Venezuela (Zulia state), and also constitutes the watershed between the Maracaibo basin in Venezuela and the valleys of the Cesar and Ranchería rivers in Colombia (Ujueta and Llinas 1990; Rivera-Díaz and Fernández-Alonso 2003).

The anuran fauna of this mountain range is one of the least studied of Colombia. Only two species of *Pristimantis*, *P. cuentasi* Lynch, 2003 and *P. reclusus* Lynch, 2003 have been described from the Colombian side of Perijá, in the Cesar department. Other three species, *P. taeniatus* Boulenger, 1912, *P. gaigei* Dunn, 1931, and *P. viejas* Lynch & Rueda-Almonacid, 1999, were reported for this mountain range by Moreno-Arias et al. (2009). However, the reliability of these records is questionable given the known distributional range of these species in Colombia (see Acosta Galvis and Cuentas 2016), and the fact that the authors did not provide voucher specimens or mention the herpetological collections where specimens were deposited. In addition, one species from adjacent Colombian Andes, *P. anolirex* Lynch 1983, and three species from the Venezuelan side of Perijá, *P. yukpa* Barrio-Amorós, Rojas-Runjaic & Infante, 2007, *P. lassoalcalai* Barrio-Amorós, Rojas-Runjaic & Barros, 2010, and *P. rivasi* Barrio-Amorós, Rojas-Runjaic & Barros, 2010, are expected to occur in the Colombian Perijá (Barrio-Amorós et al. 2007, 2010; Moreno-Arias and Medina-Rangel 2007), but there are no confirmed records available to date.

An expedition to the western slope of the Serranía de Perijá in La Guajira department (Colombia) between July and August of 2012 resulted in the finding of two unreported species of rain frogs for the country: *P. yukpa* and *P. rivasi*. All specimens were encountered when searching actively in all available microhabitats (e.g., rocks, shrubs and ground). Collection of specimens was authorized by the regional environmental authority of the Department of La Guajira (Corporación Autónoma Regional de La Guajira, Acuerdo 0021-2011). Specimens were identified by comparing them against the original descriptions of the species (Barrio-Amorós et al. 2007, 2010). Morphometric measurements were taken for all collected specimens (Table 1) using a digital caliper (\pm 0.01 mm), following Barrio-Amorós et al. (2007, 2010). Here, I follow the taxonomic proposal of Heinicke et al. 2015 to the genus *Pristimantis*. Voucher specimens are

Table 1. Selected morphometric measurements in millimeters (mm) of the specimens of *Pristimantis* species herein reported. Abbreviations are as follows: snout-vent length (SVL); shank length (ShL); foot length (FL); head length (HeL); head width (HW); internarial distance (InD); eye-nostril distance (EN); eye diameter (ED); tympanum diameter (TD); eye-tip snout distance (ETS); disk width of Finger III (F3D); disk width of Toe IV (T4D); length of Finger I (1FiL); length of Finger II (2FiL). The measures were compared with those published for the holotypes (*) in the original description of species (Barrio-Amorós et al. 2007, 2010).

Measurement	<i>Pristimantis yukpa</i>		<i>Pristimantis rivasi</i>				
	MHNL S18525*	UIS-A 5489	MHNLS 18445*	UIS-A 5485	UIS-A 5486	UIS-A 5487	UIS-A 5488
Sex	Male	Male	Female	Female	Male	Male	Male
Stage	Adult	Adult	Adult	Adult	Adult	Adult	Adult
SVL	20.80	22.60	41.00	33.03	27.59	26.44	24.62
ShL	12.20	12.30	22.00	19.57	16.53	15.12	14.78
ShL*100/SVL	58.65	54.42	53.66	59.25	59.91	57.19	60.03
FL	8.80	9.44	–	16.9	14.03	13.63	12.85
FL*100/SVL	42.31	41.77	–	51.17	50.85	51.55	52.19
HeL	8.80	8.78	17.00	13.31	10.85	10.74	10.41
HeL*100/SVL	–	38.85	41.46	40.30	39.33	40.62	42.28
HW	8.70	8.86	17.10	13.63	11.62	10.87	10.51
HW*100/SVL	41.83	39.20	41.71	41.27	42.12	41.11	42.69
HeL/HW	1.01	0.99	0.99	0.98	0.93	0.99	0.99
InD	–	2.45	3.30	3.46	3.12	3.02	2.82
EN	–	2.31	7.00	4.65	3.65	3.58	3.39
ED	3.00	3.32	5.10	3.98	3.12	3.04	2.96
EN/ED	–	0.70	1.37	1.17	1.17	1.18	1.15
TD	1.50	1.58	2.20	1.46	1.38	1.26	1.21
TD/ED	0.50	0.48	0.43	0.37	0.44	0.41	0.41
ETS	–	3.48	8.30	6.1	5.28	4.45	4.36
F3D	1.00	0.98	2.40	1.68	1.72	1.56	1.52
T4D	1.00	1.01	2.20	1.51	1.42	1.34	1.32
F3D/T4D	1.00	0.97	1.09	1.11	1.21	1.16	1.15
1FiL	3.00	3.22	7.00	6.42	5.46	4.71	4.61
2FiL	3.00	3.48	7.60	7.56	6.49	5.79	5.67
1FiL/2FiL	1.00	0.93	0.92	0.85	0.84	0.81	0.81

deposited in the Colección Herpetológica of Museo de Historia Natural of Universidad Industrial de Santander (MHN-UIS), Bucaramanga, Colombia.

Pristimantis yukpa is a small rain frog assigned to *unistrigatus* species group of Lynch and Duellman (1997), according to the original publication (Barrio-Amorós et al. 2007), but unassigned to species group by Padial et al. (2014). The species is known from six published (Barrio-Amorós et al. 2007; Figure 1) and five unpublished localities (IUCN SSC 2011) on the eastern slope of Perijá (Zulia state, Venezuela), at elevations between ca. 500 and 1,200 m (Barrio-Amorós et al. 2007; IUCN SSC 2011). The presence of this species in the western slope of the Perijá in Colombia was previously suggested but unconfirmed (Barrio-Amorós et al. 2007). This species is known to inhabit the understory of lowland and montane forests (including cloud, evergreen, and semi-deciduous dry forests), and patch forest surrounded by shrubs and plantations of cocoyam and coffee (Barrio-Amorós et al. 2007; IUCN SSC 2011). The specimen reported herein (UIS-A 5489; Figure 2) was collected on 28 July 2012 on the western slope of the Serranía de Perijá, Puerto Rico farm, Barriales-Nuevas Ideas

vereda, El Molino municipality, La Guajira department, Colombia ($10^{\circ}35'29.1''$ N, $072^{\circ}51'13.59''$ W, 850 m above sea level; Figure 1). The specimen is an adult male with vocal slits and distended vocal sac that was found calling at 22:30 h after a heavy rain, on the upper surface of a shrub at 0.9 m above ground, in a patch of evergreen lowland forest (Figure 3). The collected specimen fits entirely with the description of the species (Barrio-Amorós et al. 2007) and is characterized by (1) skin of dorsum with scattered conical tubercles; (2) skin of venter areolate; (3) upper eyelid with ill-prominent tubercles; (4) vomerine dentigerous processes small, oblique; (5) vocal slits, vocal sac and single white nuptial pads present in males; (6) finger I slightly shorter (93%) than II; (7) discs on digits longer than wide; (8) discs on fingers III and IV larger than on I and II; (9) disc on finger III and toe IV nearly equal in wide, wide proportion 0.97; (10) lateral fringes on fingers II and III; (11) two metatarsal tubercles; (12) basal webbing between toes IV and V; (13) canthus rostralis distinct; (14) snout sub acuminate in dorsal view and profile; (15) tympanum ill-conspicuous, 40% of ED; (16) cranial crests absent; (17) in life dorsum creamy brown with

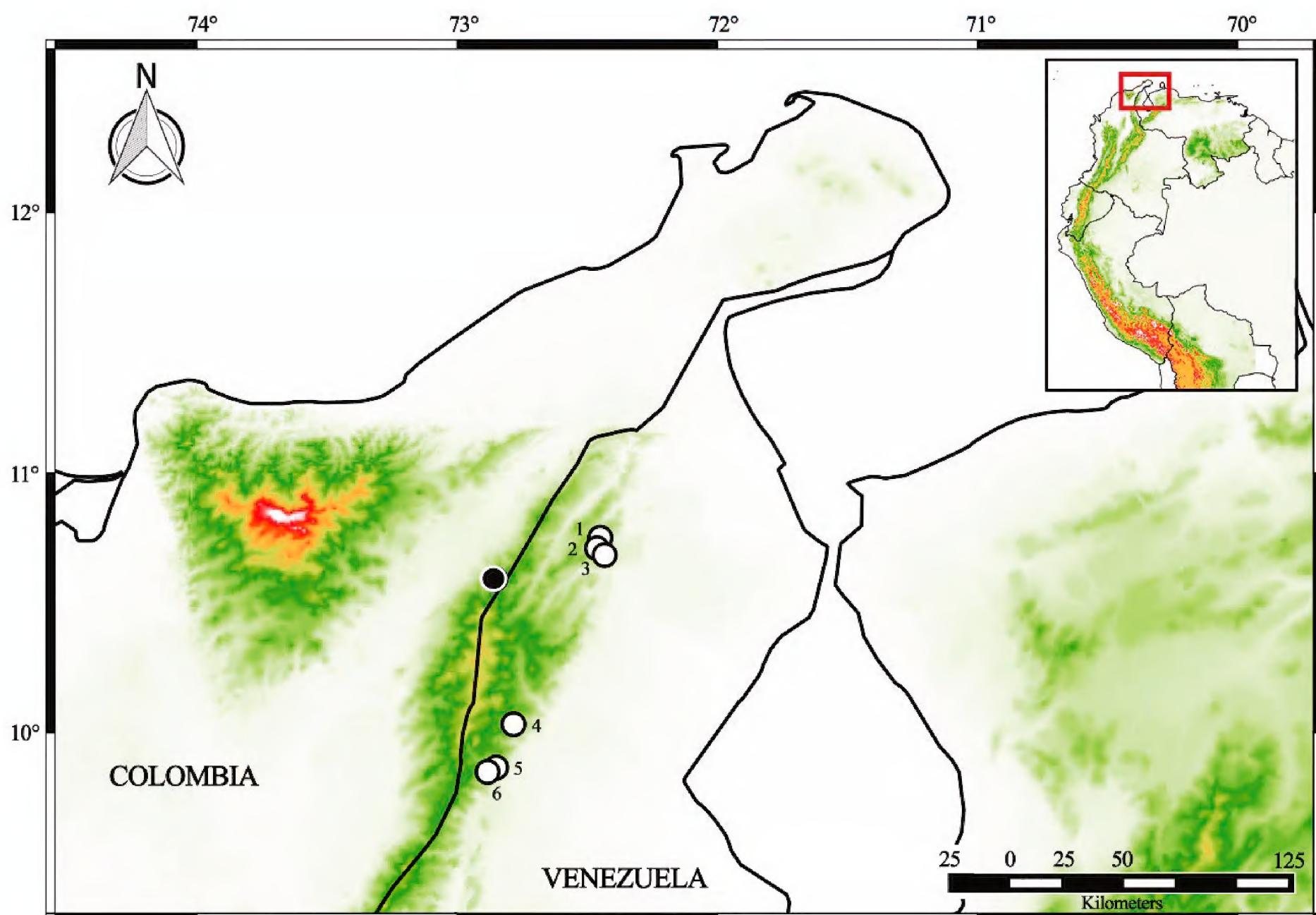


Figure 1. Map showing the new locality record of *Pristimantis yukpa* in Colombia (black dot) and the previously known localities in Venezuela (numbered white dots; Barrio-Amorós et al. 2007). 1. Cueva Los Laureles, Río Socuy basin, Jesús Enrique Lossada municipality, Zulia state (600 m elevation), 2. Fundo Las Nubes, Río Socuy basin, Jesús Enrique Lossada municipality, Zulia state (1,100 m elevation), 3. Caño María Lionza, Jesús Enrique Lossada municipality, Zulia state (551 m elevation), 4. Kunana site, Río Negro basin, Machiques de Perijá municipality, Zulia state (1,094 m elevation), 5. Surroundings of the Yukpa village Ipika, Río Tukuko basin, Machiques de Perijá municipality, Zulia state (540 m elevation), 6. Neighborhood of the Yukpa village Kiriponsa, Machiques de Perijá municipality, Zulia state (1,005 m elevation, type locality). The datum used for geographic coordinates is WGS84.



Figures 2 and 3. Photograph of a living specimen of *Pristimantis yukpa* (UIS-A 5489) from Serranía de Perijá, Colombia (2). Photograph of the locality where the specimen was collected (3).

ill-defined W and inverted V-shaped marks, and venter white immaculate; (18) iris pale bronze with fine black reticulations. Morphometric characters are presented in the Table 1. This record extends the distributional range of the species to the western slope of the Serranía de Perijá in Colombia, ca. 44.7 km west-southwest from

the nearest locality in Venezuela (Fundo Las Nubes, Río Socuy basin, Jesús Enrique Lossada municipality, Zulia state, Venezuela; Barrio-Amorós et al. 2007).

Pristimantis rivasi is a medium-sized frog member of the *unistrigatus* species group of Lynch and Duellman (1997), according to the original publication

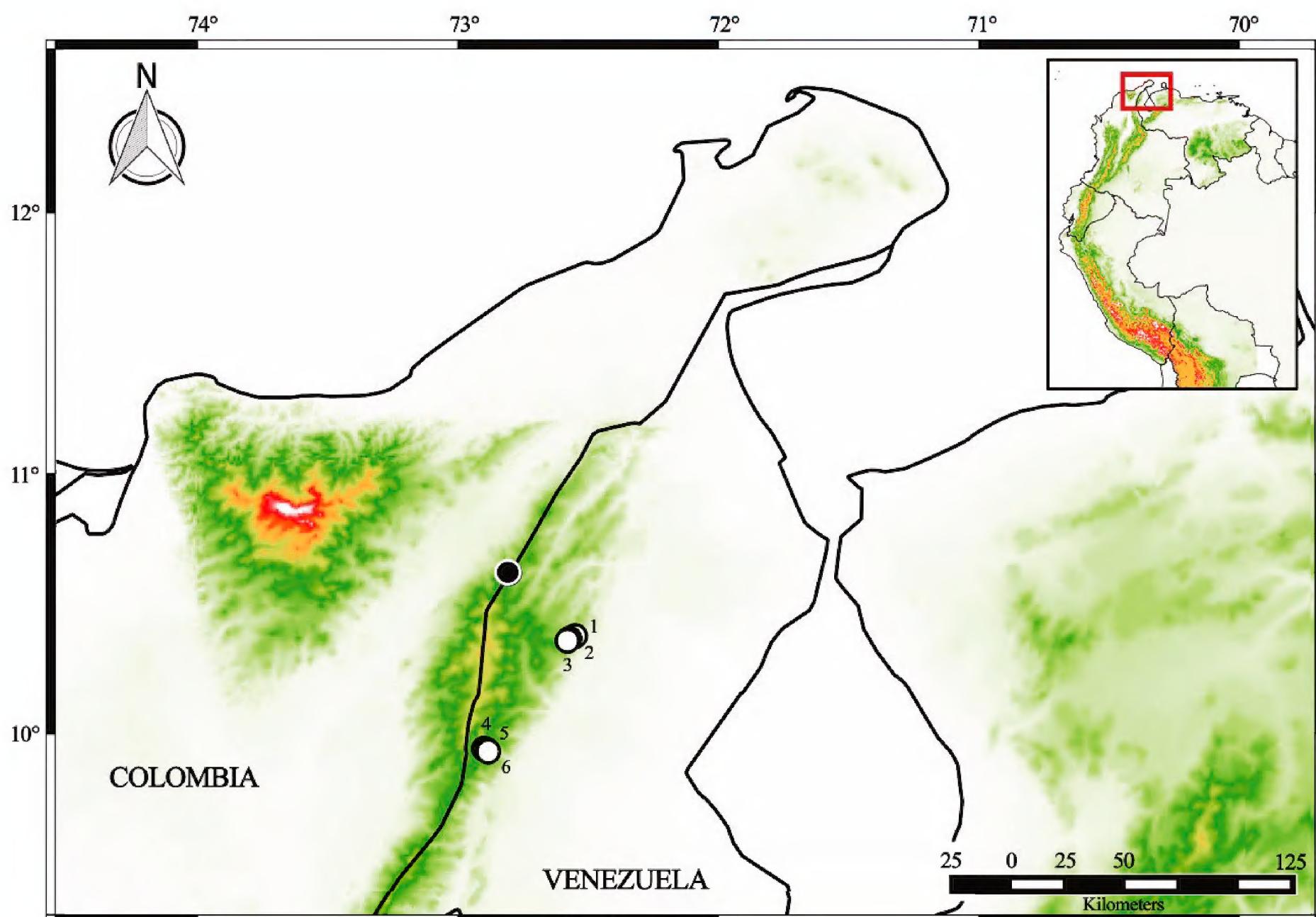
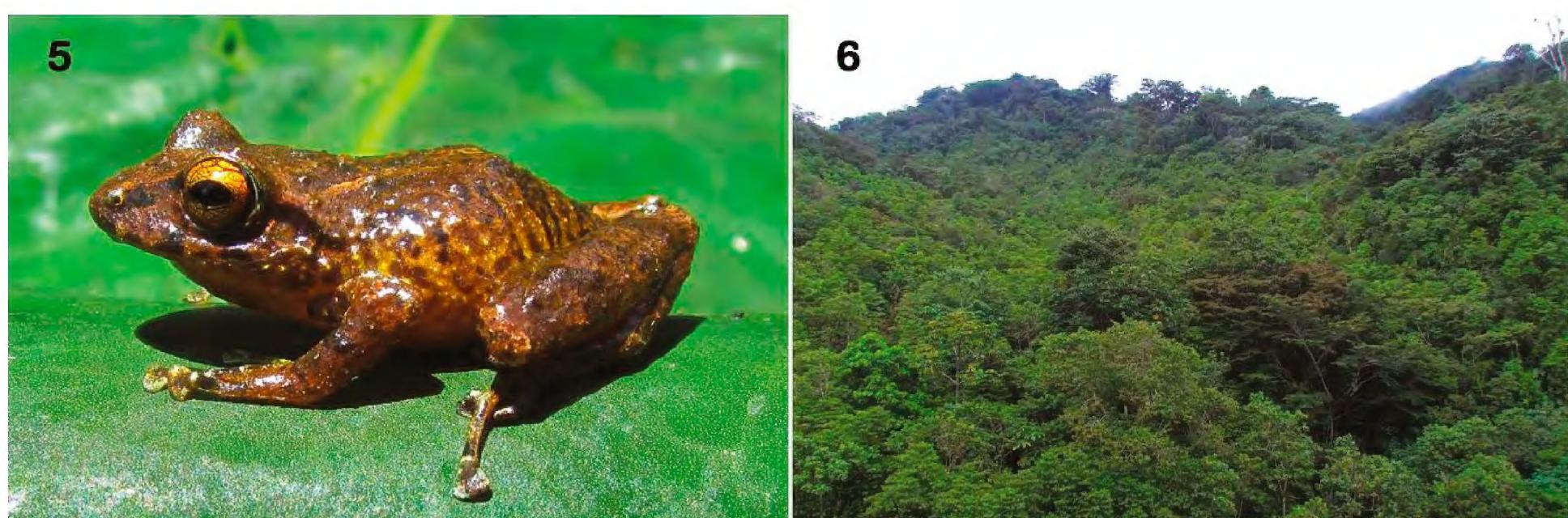


Figure 4. Map showing the new locality record of *Pristimantis rivasi* in Colombia (black dot) and the previously known localities in Venezuela (numbered white dots; Barrio-Amorós et al. 2010). The first three sites are located at Cerro Las Antenas, Rosario de Perijá municipality, Zulia state, Venezuela. 1. Creek behind the house of Cerro Las Antenas (1,449 m elevation), 2. Section of the path between the first and second antennas (1,670 m elevation, type locality), 3. Second antenna in the summit of the cerro (1,933 m elevation). The last three sites are located on the Río Tukuko basin, Machiques de Perijá municipality, Zulia State, Venezuela. 4. Surroundings of the Yukpa village Pishikakao (1,603 m elevation), 5. Hill between Yurumuto and Pishikakao (1,640 m elevation), and 6. Surroundings of the Yukpa village Yurumuto (1,389 m elevation). The datum used for geographic coordinates is WGS84.



Figures 5 and 6. Photograph of a living specimen of *Pristimantis rivasi* (UIS-A 5486) from Serranía de Perijá, Colombia (5). Photograph of the locality where the specimen was collected (6).

(Barrio-Amorós et al. 2007), but unassigned to species group by Padial et al. (2014). The species is known from six sites in two clusters (Figure 4) on the eastern slope of the Serranía de Perijá (Zulia state, Venezuela), between 1,438–1,933 m above sea level (Barrio-Amorós et al. 2010). The species was also expected to occur throughout

similar environments in the Perijá (see Barrio-Amorós et al. 2010), but no evidence of its presence was reported so far. This species occurs in the understory of premontane and montane forest, including dense primary, secondary, and patch of cloud forest, as well as coffee plantations (Barrio-Amorós et al. 2010;

IUCN SSC 2012). The specimens of *P. rivasi* reported here (UIS-A 5485 – 5488; Figure 5) were collected on 5 August 2012 on the western slope of the Serranía de Perijá, El Manantialito creek, Nuevas Ideas farm, Barriales-Nuevas Ideas vereda, El Molino municipality, La Guajira department, Colombia (10°35'15.66"N, 072°49'07.12"W, 1,750 m elevation; Figure 4). All male specimens were found vocalizing actively between 19:30 and 22:00 h, on leaves and branches of bushes up to 3 m above ground. Specimens were found in a dry rocky creek surrounding for secondary cloud forest (Figure 6). The specimens reported here match the description of the species (Barrio-Amorós et al. 2010) and are characterized by (1) skin of dorsum smooth anteriorly and shagreen posteriorly, with scattered and conspicuous small granules; (2) skin of venter areolate; (3) ill-defined occipital ridges; (4) upper eyelid with small granules; (5) small vomerine dentigerous processes, slightly oblique, each with 0.49 (± 0.5 SD) odontophores; (6) vocal slits, subgular vocal sac, and single white nuptial pads present in males; (7) tympanum present with distinctive tympanic annulus, 41% (± 3 SD) of ED; (8) subovoid snout with truncate tip in dorsal view, in profile truncate; (9) canthus rostralis rounded; (10) finger I shorter than II; (11) fingers and toes with lateral keels; (12) fingers and toes with outer pads enlarged; (13) ulnar and tarsal tubercles absent; (10) calcars absent; (11) two metatarsal tubercles; (12) basal webbing; (13) disks relatively broad in toes III, IV and V, slightly smaller than those on fingers III and IV; (14) in life dorsum creamy brown, with an ill- to well-defined W and inverted V-shaped marks, incomplete canthal stripe dark brown; (15) supratympanic stripe black; (16) ill- to well-defined brown transverse bars on legs; (17) iris orange bronze with fine black reticulations; (18) shank 59% (± 1.3 SD) of SVL; (19) head width 41.8% (± 0.7 SD) of SVL. Morphometric characters are presented in the Table 1. This new locality record extends the distribution of *Pristimantis rivasi* to the western slope of the Serranía de Perijá in Colombia, ca. 38 km northwest from the closest published record (summit of Cerro Las Antenas, Rosario de Perijá municipality, Zulia state, Venezuela).

The new records confirm the presence of these species in the western slope of Serranía de Perijá and add to the richness of *Pristimantis* frogs on the Colombian side of Perijá, increasing the number of species from two to four (*P. cuentasi*, *P. reclusus*, *P. yukpa*, and *P. rivasi*). The number of *Pristimantis* species in Colombia is increased to 211. The recent discovery of new *Pristimantis* species from unexplored areas of Perijá (e.g., Lynch 2003; Barrio-Amorós et al. 2007, 2010), suggest that additional surveys are still needed to a better documentation of the

anuran fauna in this mountain range. However, fieldwork in this region is difficult, mainly due to violence related with drug trafficking (Lynch 2003; Barrio-Amorós et al. 2007, 2010). The probable discovery of undescribed species of *Pristimantis* in Perijá is still pending.

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